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Fiscal and economic impacts of state incentives for wind energy development in the Western United States

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ABSTRACT

Wind energy production in the United States has seen significant growth over recent years due, in large part, to the state and federal policies designed to encourage wind energy development. This research focuses on measures undertaken at the state level in the western region of the United States. Several of these states have implemented legislation in the form of financial incentives and renewable portfolio standards to support wind development. It is shown that state tax incentives and physical drivers have a significant positive impact on wind energy growth. There has been concern, however, about the fiscal impacts of financial incentives on state tax revenues. As a result, some states have removed tax incentives. A recent example is the removal of sales and use tax rebates for wind producers in Idaho. However, the removal of such incentives results in a net loss of tax revenues as well as negative economic impacts by hindering the development of wind energy projects. It is shown that attendant economic benefits from wind development results in significant positive fiscal impacts by increasing tax revenues for state and local governments. The increased tax revenues begin with the pre-construction and construction phases of such projects and continue to accrue throughout the life of project operations until eventual decommissioning. The removal of this incentive in Idaho results in a net reduction in tax revenues as well as the loss of significant economic benefits in terms of employment, incomes, and total output for the State.

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1. Introduction

Wind energy development has increased substantially in the United States (US) over recent years. From 2000 to 2012, total wind energy installations increased from 2453 MW to 51,644 MW, an average growth rate of approximately thirty percent (30%) per year [1,2]. A central question for potential developers of wind energy is where to locate such projects. Recognizing the benefits of wind energy, states have sought to attract wind power investment by enacting policies in the form of tax exemptions, deductions, and credits, as well as various subsidies (grants, low-interest loans, and production incentives) and renewable portfolio standards (RPS). The existing literature on the role of federal and state policies on wind power development in the United States demonstrates that these policies can have significant impacts on new wind energy capacity additions.

Financial incentives at both the federal and state levels have been shown to be important determinants of wind energy development. At the federal level, one of the most important incentives is the renewable energy production tax credit (PTC), initially authorized by the Energy Policy Act of 1992. The PTC has a volatile history, having been allowed to expire twice and being renewed for only short periods during the past decade. Hitaj [3] shows that the variability in the presence and amount of this federal incentive is an important determinant of the number of new wind power facilities in the US. In addition to federal incentives, several studies to date have concluded that state-level incentives for wind energy producers are important drivers behind wind energy development. Several of these focus on the use of renewable portfolio standards (RPS) on the part of states (see [4–6]) while others look more broadly at the variability of state level financial incentives and their effects on wind power development ([3,7–9]).

This study reviews the financial incentives for wind energy production in the western United States and the impact that these and other policies have had on wind development. The states examined are Idaho, Montana, Oregon, Utah, Washington, and Wyoming. While states can influence locational decisions by a variety of tax and other incentives, questions arise as to the impacts of such measures on state and local government revenues. For states offering exemptions or rebates, these policies are often viewed as expenditures on the part of the state and, as a result, such incentives have come under mounting scrutiny. A recent example where such concerns have resulted in the removal of tax incentives for alternative energy production is Idaho which, in 2011, failed to renew the state's tax incentive program offering sales and use tax rebates for to wind energy producers.

In order to determine the effect of tax incentives for wind energy projects, this study compares the stream of tax revenues stemming from wind energy development with the tax revenue forgone due to sales and use tax exemptions or rebates. Detailed data on capital and operating expenditures are obtained from several wind developments in Idaho. Tax rates are applied against this spending to estimate the stream of foregone revenue. Other tax revenues are estimated directly from capital and operations expenditures that are not subject to rebates or exemptions. These include personal and corporate income taxes, motor fuels, and consumption taxes. These revenues, as well as economic impacts on employment and incomes, are estimated using Input–Output analysis.

The issue for policymakers is whether the incentives offered by the tax rebate are significant enough to encourage alternative energy projects in a given state as opposed to surrounding states. With regard to the tax incentives in Idaho, it is important to note that the states surrounding Idaho have similar physical characteristics with regards to renewable energy resources, but the fiscal conditions vary. All of the states surrounding Idaho either have no sales and use tax or offer tax exemptions for purchases related to renewable energy development. In addition, all surrounding states offer additional tax incentives for alternative energy projects. Even with a continuation of the sales and use tax rebate program, Idaho would rank last in terms of fiscal incentives for alternative energy producers. This study finds that, in the case of sales and use tax incentives in Idaho, the provision of this incentive to producers generates a net increase in tax revenues. To the extent that wind developers decide to locate in other states due to more favorable economic and fiscal factors, the discontinuance of such fiscal incentives leads not only to decreased production of renewable energy but also to the loss of economic benefits from increased employment, incomes and economic activity and the associated tax revenues.

This study's analysis does not extend to electric grid management and operational issues in regard to intermittent renewables integration and Idaho's total net summer capacity of 3990 MW electric [10] nor to the question of the optimal amount of wind energy is appropriate from an energy and political standpoint. The study focuses on the opportunity costs and tax implications for Idaho in comparison to other states with similar real incentives for wind development and, as a result, it is beyond its scope to examine alternative scenarios in which tax incentives are provided to other industries or funds are spent on government programs or state-owned infrastructure.

2. State level incentives for wind energy development in the Western United States

The location of wind energy facilities is subject to geographic as well as economic factors, and all of the western states have suitable locations for wind energy production. Consequently, states in the region compete with each other during the process of producers deciding to locate production facilities in one state versus another. The economic climate influencing such decisions depends in part on the tax regimes of the states under consideration as these provide important incentives for the development of new wind energy production which, in turn, provides significant economic and tax revenue benefits. Given that the focus of the present study is the tax incentives offered by Idaho, it is important to note that other western states have fiscal incentive programs that, for the most part, are more generous to producers than those provided by Idaho. This section reviews these incentive programs in Idaho and other western states.

2.1. Idaho

Idaho's wind energy capacity was 75.22 MW in 2005 and grew following the passage of state-level incentives, reaching 675 MW in 2012, as shown in Table 1. The passage of the Idaho sales and use tax rebate for alternative energies, enacted in 2006, spurred the rapid increase in wind energy capacity. The sales and use tax rebate for alternative energy production was authorized under Idaho Statute 63-3622QQ. To receive the rebate, the developer of a new alternative energy facility, including wind energy, would pay any sales and use tax on the machinery and equipment and then a public, cooperative, or municipal utility or the Idaho Public Utilities Commission would certify that the project will generate at least 25 kW of electricity. After certification, the producer would file a refund request with the Idaho State Tax Commission by the end of the third calendar year after the taxes to be refunded were paid. Machinery and equipment that qualified for a rebate on sales and use taxes paid were required to be industrial fixtures, or devices that supported facilities that were integral and necessary to the generation of electricity from the specified alternative energy sources. The rebate would not apply to machinery and equipment such as hand-powered tools, repair or replacement parts, hand tools, buildings or building fixtures not integral to generating electricity.

One advantage of such an incentive is that the state does not need to provide additional physical infrastructure, such as industrial

Table 1
Source: [11,12].

Project name	Output (MW)	Owner	Power purchaser	Year site went operational
Horse Butte	57.6	Horse Butte Wind 1 LLC	Utah associated municipal power	2012
Idaho wind partners 1 (11 farms – 2011)	118.5	Idaho wind partners 1, LLC	Idaho power	2011
Power county	45	CG Power solutions	Pacificorp	2011
Rockland	79.2	Ridgeline Energy	Idaho power	2011
Sawtooth	22.4	Idaho Winds LLC	Idaho power	2011
Goshen North	124.5	BP Wind Energy/Ridgeline Energy	Southern California Edison (SCE)	2010
Idaho Wind Partner 1 (11 farms – 2010)	64.5	Reunion Power/Exergy Development Group	Idaho Power	2010
Tuana springs	16.8	John Deere Wind	Idaho Power	2010
Cassia	29.4	John Deere Wind	Idaho Power	2009
Mountain Home	42	John Deere Wind	Idaho Power	2009
Hydrogen pilot project	0.1	Idaho Synthetic Fuels	n/a	2006
Wolverine Creek	64.5	Invenergy	PacifiCorp	2005
Fossil Gulch	10.5	Exergy Development Group/United Materials	Idaho Power	2005
Lewandowski Wind Farm	0.22	Bob Lewandowski	n/a	2003
Total	675.22			

wastewater infrastructure or refurbishment of manufacturing facilities, to attract wind developers and projects. In addition, through future increased tax revenues the incentive enables Idaho to take advantage of other states' renewable mandates if the power is purchased by utilities outside the state. On the other hand, some wind opponents in Idaho have viewed the latter attribute as a disadvantage due to the change in viewshed, individual property values, and sense of local place [13]. Additionally, some state officials and opponents expressed caution about the early cost estimate of $47 million for the sales and use tax rebate [14], despite the potential for future increased tax revenues and its lack of effect on the state's general fund [15], as well as inertia in creating a constituency for incentives after the purpose has been reached.

State officials trepidation about the perceived immediate cost of the incentive versus future gains matches past research on government spending. State and local governments tend to spend based on current resources rather than longer-term forecasts [16]. Furthermore, decision-makers have a tendency to cut incentives, expenditures, and revenue collection efforts for short-term reasons in times of economic contraction, often exacerbating the downturn and cyclicality of economic trends [17]. Ultimately, the 2011 Idaho legislature failed to approve an extension of the sales and use tax rebate incentive and it expired on July 1, 2011. This incentive program is the main focus of the following section and will be examined in more detail below.

Another tax incentive in Idaho, authorized by Idaho Statute 63-3502B, offers a property tax exemption for wind and geothermal energy producers. Enacted in 2007, this exemption applies to real estate, fixtures, or property related to the production of renewable energy systems. In lieu of paying property taxes, this provision specifies that wind and geothermal producers pay a tax of three percent (3%) of annual energy earnings to the county. Wind developers that are regulated by the IPUC are excluded from this exemption [18,19]. Currently, only two wind farms qualify for this credit in the state.[1]

In addition to these state-level incentives, wind energy producers benefit from the provisions of the federal Public Utility Regulatory Policies Act (PURPA), enacted by Congress in 1978 to promote the development of alternative energy technologies. It requires electric utility companies to purchase power generated by a qualified facility (QF) at the avoided-cost rate, which is determined by each state's utility. In Idaho, the Idaho Public Utilities Commission (IPUC) determines not only the avoided rate but also the size of the qualified facilities. At the end of 2005, the Idaho Public Utilities Commission (IPUC) temporarily reduced the size of a qualified wind energy facility from 10 MW to 100 kW or smaller [20]. Since the size of a single commercial wind turbine is significantly larger than 100 kW, the new policy restriction allows utilities to pay wind power producers at a lower rate than the avoided-cost rate set by the state commission. Thus, during the time the size reduction was in effect,[2] no new wind energy projects were constructed and all the projects that were in queue to be built[3] were never erected (Table 1).

In the beginning of 2008, the size reduction that the IPUC mandated was raised back to 10 MW. Following this increase in the size of QFs, wind energy capacity in the state grew rapidly to 352 MW (see Table 1) with several projects under development. In December 2010, however, the IPUC again temporarily reduced the size of a qualified wind energy facility, but this time allowed wind energy producers that already had a power purchase agreement (PPA) to be exempt from the restriction.[4] At the end of 2012, the IPUC ruled that the temporary size reduction would become permanent for qualified wind energy facilities. Wind power projects larger than 100 kW would pay a lower avoided-cost rate set by the utilities, but utilities would be legally obligated to purchase the electricity produced by the wind energy facilities. In addition, projects larger than 100 kW would also have to share half of the Renewable Energy Certificates (RECS or “green tags”) with utilities [21]. For every one megawatt-hour (MWh) that a wind project generates, it receives one REC. RECs are a separate commodity that can be sold to other states that have to comply with their RPS or sold individually to consumers and businesses [22]. The base price for one REC sold to Idaho consumers or businesses ranges from $4.00 to $19.50 [23–25].

The expiration of the Idaho sales and use tax rebate program and the reduction in the size of QFs eligible for higher avoided cost electricity rates will likely lead to a loss of wind energy projects constructed in the State. Although wind energy projects currently permitted or under construction will likely go forward because these facilities secured PPAs before the size reduction, several of these producers will have to enter into negotiations with the electric utilities.

[1] The Horse Butte (57.6 MW) and Goshen North (124.5 MW) wind projects are located in Idaho, but are governed by other utilities outside the state of Idaho. All other wind projects in the state have PPAs with Idaho's public utilities (see Table 1) and thus, are regulated by the IPUC.

[2] The size reduction that the IPUC placed on wind projects that would qualify for the state's avoided cost rate was placed in August 2005 and returned to 10 MW in February 2008 [18].

[3] Wind developers had sent applications of intent to build 193 MW of wind generating capacity before the IPUC reduced the size a wind project could qualify for the PURPA rate [21].

[4] There were seventeen wind projects that were not exempt and now have to enter into negotiations with utilities [14].

Under current provisions, utilities may offer rates lower than the avoided cost under PURPA and wind developers will have to accept conditions that would make their projects substantially less profitable (e.g. uncompensated curtailment of power).

2.2. Oregon

Oregon has been a leader in wind development, not only in the northwest but also nationally. From 1999 to 2011, Oregon has been among the top ten states in total wind power capacity [1]. By the end of 2012, Oregon had 3,153 MW of operational wind generating capacity, placing Oregon's wind energy industry the largest in the northwest and ranking fourth in the United States [2]. The future of Oregon's wind industry does show promise of significant growth, providing evidence that Oregon will remain a leader of wind energy development. The American Wind Energy Association has reported that there is over 14,000 MW of wind generating capacity in the process of being built, which is more than all the northwestern states combined [26,1]. The primary factors that have been supporting Oregon's growing wind industry include an established transmission infrastructure and state-level incentives for renewable energy producers [27].

Commensurate with its level of wind energy capacity, Oregon offers a host of state-level incentives. Oregon has never had a sales tax [28], hence wind developers do not pay a tax on any purchases of equipment or machinery related to energy production. In addition, real property on wind energy facilities, including land and equipment, is exempt from Oregon property taxes [29]. Oregon also offered a tax credit for renewable energy resource generation, as part of its Business Energy Tax Credit (BETC) program. The tax credit equaled fifty percent (50%) of the construction costs of new facilities or the improvement of existing facilities. The credit, capped at $20 million, is generally taken for a period of five years at ten percent (10%) per year. Eligible costs include all costs directly related to the scope of a qualifying project. This includes equipment costs, engineering and design fees, materials, supplies and installation costs. In 2011, the Oregon legislature created sunset dates for BETC. The first sunset date required that all facility owners to complete their projects and submit a final application for a tax credit by January 1, 2013. Facilities under construction can be eligible for the tax credit if construction is completed by July, 2104.

In addition to tax incentives, Oregon offers other programs to attract wind development. In 1999, state lawmakers enacted legislation that mandated Pacific Power and Portland General Electric (PGE) to collect a three percent (3%) charge from their customers to support energy efficiency and renewable energy projects through January 1, 2026. The Oregon Public Utility Commission (OPUC) authorized a non-profit organization called the Energy Trust of Oregon to administer these funds in which 17.1% of the funds are to be allocated to renewable energy projects. These funds are allocated to different projects in the form of grants and other financial incentives [30]. More recently State legislators also established a renewable portfolio standard (RPS) for electric utilities and electricity suppliers as part of the Oregon Renewable Energy Act of 2007. Large utilities that serve Oregon's residents must ensure that a percentage of their electricity come from newer eligible renewable energy sources. Beginning in 2011large utility companies must provide that at least five percent (5%) of their energy be derived from a renewable energy source and this percentage increases by five percent (5%) every five years until 2025 [31].

Oregon also offers the Energy Trust program that offers cash incentives for renewable energy projects that are 20 MW (MW) or less in capacity. In addition, Oregon offers a variety of low-interest loans and grants to firms that demonstrate that projects meet certain economic development and environmental criteria. Many renewable energy generation projects are suitable for these loans and grants.

2.3. Washington

Washington has a history of attracting commercial wind developers. Washington's wind power industry began in 2001 when it added 177 MW of wind energy capacity. By the end of 2012, almost 2700 MW of wind energy installations were operational, the sixth largest wind power capacity installed in the US. [32]. The wind industry in Washington is expected to continue to develop with over 5800 MW projected to be built [32]. The drivers for wind energy development in Washington are utilities, consumer's desire to purchase green power, market conditions and its financial incentives available to wind power developers [9].

In terms of tax incentives, Washington has offered exemption from state sales tax. Until June, 2013, alternative energy producers in Washington were fully exempt from paying sales tax on machinery and equipment used to generate electricity from renewable sources such as fuel cells, wind, biomass, tidal or wave energy, and geothermal [33]. The sales tax exemption dropped from 100% to 75%.

In addition to the sales tax reduction, Washington offers incentives to be paid on electricity produced from wind power. This production tax credit is a production incentive that starts at a rate of 12¢ per kWh. If the electricity was produced using a wind generator equipped with an inverter manufactured in Washington State, the rate increases to 18¢ per kWh. The incentive is capped at $5,000 per year and expires on June 30, 2020 [34]. Washington also specifies a renewable portfolio standard (RPS) that mandates large utilities that serve more than 25,000 to acquire 15% their electricity from an alternative energy sources by 2020 and to undertake cost-effective energy conservation. It establishes short-term goals to meet this requirement by having utilities obtain three percent (3%) of their electricity from renewable sources by January of 2012 and nine percent (9%) by 2016 [35].

2.4. Wyoming

At the end of 2012, Wyoming had 1410 MW of wind power capacity ranking the State thirteenth in total wind power installations within the United States [1]. Wyoming had been an early recipient of wind energy investment due to its abundant resource of wind and its sales tax exemption [21]. The tax exemption was specifically important and a major incentive for the construction of the Wyoming Wind Energy Center, Wyoming's largest wind energy facility with a capacity of 144 MW [9]. Recently, however, the State has not built any new wind generating facilities nor is there any wind energy projects under construction [36].

Examining Wyoming's state policies that affect wind energy investment provides an adequate explanation of why the growth of the State's wind industry has subsided. Similar to Idaho, Wyoming does not have an RPS and lacks many financial incentives other states offer [36]. Its sales tax exemption for renewable energies, Wyoming's only financial incentive for wind developers, expired in 2011 and was not renewed [37]. Furthermore, effective January 1, 2012, a $1 per MWh tax will be placed on electricity generated from a wind energy facility [38]. Critics of the wind production tax argued that the policy would negatively impact wind energy investment and discourage wind energy developers from building in the state [39].

2.5. Utah

By the end of 2012, 325 MW of wind energy were installed in Utah. Growth in the wind industry began at the end of 2008 when Utah's first commercial wind project was constructed with a nameplate capacity of 18.9 MW. After 2008, two more commercial wind-generating projects were constructed [40]. Utah has not been an early recipient of wind energy investment due to the lack of state incentives and opposition from its residents to wind energy development [41]. Although Utah's wind industry has received less wind energy

installments compared to other states in the region, upcoming wind projects are expected to triple the size of the State's wind energy industry, with 1052 MW of wind energy installments in the process of being constructed at the end of 2012 [40].

As with Oregon, the purchase or lease of equipment used to generate electricity from renewable resources is exempt from sales tax in Utah. Renewable energy facilities must have a minimum capacity of 2 MW or greater. This tax exemption expires on June 30, 2027 [42]. In addition, Utah offers a corporate tax credit to further encourage wind development that offers a non-refundable tax credit for up to 75% of corporate withholdings and other state taxes over the life of the project, or 20 years, whichever is less [43]. The State also offers a production tax credit that became effective in November 2012 to further support the production of energy that is derived from a renewable energy source. This tax credit offers renewable energy facilities that produce 660 kW or more a $0.0035/kWh credit for four years [44].

Utah's renewable portfolio standard, enacted as part of the Energy Resource and Carbon Emission Reduction Initiative (S.B. 202), requires utilities to pursue renewable energy only if it is cost-effective to do so. The initiative determines cost-effectiveness by an assessment of whether acquisition of the renewable energy resource will result in the distribution of electricity at the lowest reasonable cost. Thus, under this initiative, utility companies must use eligible energy resources that account for 20% of their 2025 adjusted retail electric sales. Unlike a renewable portfolio standard, S.B. 202 does not require utility companies to have any short-term goals making 2025 the first year utility companies are required to be in compliance [45].

2.6. Other states

For the remaining states proximal to Idaho, the incentives for wind energy production are similar to the range of provisions described above. As with other neighboring states, Nevada provides a host of incentives to producers of alternative energy producers. The State provides for an abatement of sales and use taxes for machinery and equipment used to generate electricity from renewable resources [46–48]. In addition, renewable energy producers may receive a 55% property tax reduction over a 20-year period on real and personal property used to generate electricity. Nevada also implemented a renewable energy portfolio standard that requires state investor owned utilities and retail suppliers of electricity to supply 25% of all electricity from renewable resources by 2025 [49].

Colorado offers sales tax exemption under Colorado Statute 39-26-724 in which individuals and firms are exempt from sales taxes on all components used in the production of renewable energy facilities. These include wind turbines, solar modules, trackers, generating equipment, supporting structures, towers, foundations, wiring, and other components. Under current law, the statute will sunset on July 1, 2017. Colorado also offers property tax reductions for wind-energy facilities installed on or after June 1, 2006. In addition, Colorado offers a variety of utility grant and loan programs to renewable energy producers. For example, Colorado offers the New Energy Economic Development Grant Program for up to $2 million per project.

Similarly, Montana offers a reduction in property taxes for new alternative energy generation facilities and for expansion of existing facilities [50–52]. The taxable value of the property is reduced by 50% over five years with the value of the reduction being phased out over the following five years. In order to qualify for the reduction, generating facilities must exceed one MW of electricity from renewable energy sources. In addition, Montana authorizes an alternative energy tax credit for up to 35% of income from any alternative generating facility located in the State [53,54]. The tax credit applies to the first seven years of production from a facility on non-reservation land. For facilities located on Indian reservations, the tax credit applies for 15 years. There is currently no expiration date for this program.

2.7. Overview

This review of some of the drivers and barriers to wind energy development within eight states of the western US. enables some important observations. It is clear that state incentives in the form of corporate, sales and property tax credits, as well as production incentives and RPS, play a major role in wind power development at the state level. When these incentives are combined with physical drivers (e.g. wind power potential, access to transmission, land to site commercial projects), wind power growth continues to increase in these states overall, especially in the states of Washington, Utah and Oregon.

It is also clear that, just as states have the ability to incentivize wind power development, states can also discourage wind energy growth. State policymakers can enact legislation such as a production tax on wind energy, reducing the size that a wind facility can qualify for PURPA rates, or allowing key incentives to expire. Disincentives can act as a powerful deterrent to wind power development. Examples include policies in the states of Wyoming and Idaho. A case in point is the recent decision by Idaho to not pass an extension to the State's sales and use tax rebate program for alternative energy production and its resultant expiration in 2011. The next section examines the fiscal and economic impacts stemming from offering this type of incentive to wind energy producers. It is shown that the increase in other types of tax revenues to state and local governments from new wind development projects significantly exceeds the loss in sales and use tax revenues. In addition to the net positive fiscal impacts, such development also generates positive economic impacts stemming from increased employment, personal income, economic activity, and state output. States failing to offer sufficient incentives for the location of wind energy facilities risk losing these positive fiscal and economic impacts to neighboring states.

3. Fiscal and economic impacts of Idaho's sales tax rebate incentive for wind energy development

A central issue for policymakers is whether the incentives offered by tax and other programs are significant enough to encourage alternative energy projects in a given state as opposed to surrounding states. The states surrounding Idaho have similar physical characteristics with regards to renewable energy resources, but the fiscal conditions vary. All of the states surrounding Idaho either have no sales and use tax or offer tax exemptions for purchases related to renewable energy development. In addition, all surrounding states offer additional tax incentives for alternative energy projects. Prior to the expiration of Idaho's sales and use tax rebate program, Idaho and Wyoming offered the least attractive fiscal incentives for alternative energy producers among the eight states reviewed in the preceding section. By allowing the tax rebate program to expire, coupled with Idaho's classification of facilities qualifying for avoided cost rates under PURPA, Idaho is arguably the least attractive state in the western US. for new wind energy projects.

The reduction in tax revenue due to tax exemption and rebate programs are often viewed as expenditures on the part of state governments, and opponents of such programs have argued that the elimination of such programs will reduce such expenditures and lead to increased state tax revenues. However, it is important to note that, to the extent that developers of alternative energy projects decide to locate in other states due to more favorable economic or fiscal factors, state governments realize losses in job creation and economic activity or associated tax revenues.

As described in the previous section, Idaho offered a sales and use tax rebate to purchasers of qualifying machinery and equipment used directly to produce a variety of alternative methods of electricity generation. These included fuel cells, low impact hydro, wind,

geothermal, biomass, cogeneration, solar and landfill gas. This study evaluates the fiscal impacts on a variety of tax revenues received by the state. The decrease in sales tax revenues stemming from the rebate program is compared to increased personal, corporate, sales, and other tax revenues stemming from increased incomes, employment, and total output from renewable energy development projects.

3.1. Estimating economic and fiscal impacts of new wind facilities. Study

This study uses a representative wind project of 160 MW nameplate capacity in order to estimate the revenues accruing to state and local governments from the development and operation of the facility. Expenditures and activities accrue during the pre-construction and permitting phase and the construction phase of project development as well as the operations phase. The key result of this analysis is that the economic and fiscal impacts fully repay the State's initial rebate expenditure and yield significant additional tax revenues at both the state and local levels for the remaining life of the project. In addition to the effects on tax revenues, these projects yield significant increases in jobs and economic activity, especially at the local level.

There are two main approaches to estimate the tax effects of alternative energy generation. First is the direct calculation of sales, PILOT,[5] and other taxes paid during the pre-construction, construction and operation phases of alternative electricity production. As shown in the following section, these increased revenues to the State are significant. In addition to these direct fiscal calculations, this study estimates the increased tax revenues stemming from measurable increases in incomes, employment, total output of goods and services, and tax revenues. To do so, this study tracks the expenditures on goods and services purchased in the State during each phase of alternative energy development projects as well as the incomes of employees. The output that results from these expenditures by producers is known as the direct economic effects. For example, local expenditures by producers during the permitting, construction, and operation phases create increased economic activity and generate increased tax revenues.

In addition to these direct effects, this study evaluates the inter-industry effects on input suppliers and contractors and their employees. The purchases on the part of suppliers of goods and services to alternative energy producers are known as the indirect effects and also increase incomes and tax revenues. Spending by households whose incomes have increased, and the corresponding fiscal impacts, are known as the induced effects in Input–Output analysis. It should be noted that the direct economic effects are by far the largest component of the total economic impact. It is also important to note that the indirect and induced effects constitute real and important increases in incomes and tax revenues, besides the opportunities for employment and income for Idaho residents.

3.2. Methodology and data

This study focuses on the tax revenue effects of the increases in economic activity and incomes during the permitting, construction, and operation of alternative energy generation projects. To do so, a standard Input–Output (I–O) Analysis is performed to track how the direct effects of increased economic activity, incomes and expenditures are transmitted throughout the Idaho economy. These, in turn, result in increased tax revenues. A variety of I–O models are available and this study uses a detailed, sophisticated, and widely used model known as IMPLAN. This model was originally developed for estimating the effects of natural resource development projects. Like all I–O models, the one employed here captures the interconnectedness of the regional economy by taking into account the fact that different types of industries buy inputs from each other and sell their products to each other. This is one way in which increases in output and employment in one industry will cause increases in output and employment in all the industries from which the first industry purchases its inputs. It has been refined and expanded for analyzing a wide variety of economic activity and incorporates detailed inter-industry data on a county-by-county basis in Idaho across 440 sectors of the Idaho economy to account for the flows of economic activity throughout the State.

Information about the size and location of purchases that alternative energy producers make in Idaho was provided by developers of wind-powered electrical generation facilities. These data include in-state and out-of-state purchases of equipment, construction costs, employment, and other information. The IMPLAN model tracks the direct employment and expenditure effects of these projects throughout the Idaho economy as well as the subsequent indirect and induced effects on Idaho suppliers and their employees.

The fundamental question to be addressed in this study is whether the sales and use tax rebate program results in a net gain or loss in terms of tax revenues to the State of Idaho. Rather than approach this issue in the aggregate, by examining total rebate expenditures and tax revenues on a statewide basis, a more accurate approach is to examine rebate expenditures and tax revenue effects on a per-project basis. One reason for this is that aggregated tax revenue data on a per-industry basis is not available. Another principal reason for approaching the question on a per-project basis is that, by doing so, the variety of tax revenues resulting from the development of alternative energy in the State can be estimated in much greater detail and with much more accuracy. Due to this study's focus on tax revenues and benefits to the state in a competitive regional environment, specifically with regard to wind, integrated employment comparisons between energy technologies such as jobs per megawatt are beyond the scope of the study (for detailed discussion see [55–57]).

A variety of types and sizes of alternative energy production projects have been undertaken in the State over recent years. Further, several are currently in the development phase. Pre-construction, construction, and operating phase data for several wind facilities in the State were obtained from producers. The projects generally fell into two size ranges of approximately 80–100 MW and 150–170 MW capacity. Under the assumption that economies of scale for these projects are not significant, the question of whether the net effects of the sales and use tax rebate provision are positive or negative is invariant with respect to these differences in project size. In addition, the payback period for the initial rebate expenditure is similarly invariant to project size. Further, the relative size of the effects on tax revenues is proportional across project size. In other words, larger projects will involve larger rebate expenditures but will also generate larger increases in other tax revenues. Thus, this study uses a representative wind project of 160 MW capacity to estimate the size of sales and use tax rebate expenditures by the State and to compare those expenditures with offsetting increases in tax revenues from the increased economic activity from such a project.

Detailed information on pre-construction permitting expenses, construction phase expenditures, and operating expenditures over the life of each project was provided on six wind energy projects either recently completed or currently under development by four different producers. During the pre-construction phase involving permitting and transmission preparation activities, expenditures include expenses for contractors, engineers, leasing and lease option payments, initial site development, leasing, meteorological data collection, mapping, personnel, lodging, transportation, and related expenses. During the construction phase, expenses include the costs of purchasing and installing wind turbines and related equipment, site

[5] These are payments in lieu of taxes. Idaho Statute 63-3502B offers alternative energy producers exemption from property taxes and instead requires payment in lieu of taxes equal to 3% of gross revenues.

preparation and construction, meteorological tower equipment and installation, engineering services, construction management, concrete and other materials, road improvement and construction, personnel, lodging, transportation, and related expenses. During the operations phase, expenses include ongoing lease and royalty payments, PILOT expenditures, repair and service costs (warranty and non-warranty), insurance, mitigation payments, tower and equipment maintenance, spare parts, road and site maintenance (including snow clearing and weed control), and decommissioning costs at the end of the useful life of the project.

To determine the tax revenue implications, sales taxes were directly calculated for relevant purchases not subject to the sales and use tax rebate during each phase of project development and operation. In addition, PILOT payments and income and sales taxes stemming from royalty payments were also calculated directly from expenditure data received from producers. The Input–Output model was used to calculate tax revenues stemming from increases in corporate and personal income from the direct, indirect, and induced economic impacts. These include individual income, corporate income, sales, cigarette and tobacco, beer and wine, motor fuels, liquor, and insurance premium taxes.

4. Results

Two fundamental issues in considering the effects of tax incentives for economic development are the effects on overall state budgets as well as the revenue impacts for local governments. To estimate these effects in the case of sales and use rebate programs for wind energy development, this study calculates the initial rebate expenditure by the State of Idaho to wind energy producers. These expenditures are then compared to the increases in tax revenues for state and county governments stemming from the increased economic activity and associated tax revenues due to the development and operation of wind energy projects. This study demonstrates that, in the case of sales and use tax rebate programs, the tax revenues resulting from increased development of alternative energy projects constitute positive contributions to the fiscal health of the State and counties.

In terms of the costs of the sales and use tax rebate program in Idaho, much of the expenditures subject to the tax rebate provisions occur during the construction phase of these projects. For example, the vast majority of the tax rebate expenditures result from the purchase of wind turbines and related equipment subject to rebates under Idaho Statute 63-3622QQ. For the 160 MW representative wind project used for this analysis, the project developer would have been eligible for approximately $12 million in tax rebate based on the qualifying expenditures on machinery and equipment directly related to energy production.

Although tax rebates constitute expenditures on the part of the State, there are increased revenues generated to both state and local governments from taxes generated directly from the construction and operation of wind energy facilities as well as the tax revenues from the associated indirect and induced economic activity. During the construction phase of wind energy facilities, for example, there are considerable capital expenditures that are not subject to the sales and use tax rebate program. As a result, these activities generate significant tax revenues both prior to and during the construction phase of these projects. These, as well as other tax revenues, account for nearly $5.06 million in tax revenues to the state and $1.18 million to county governments for the representative 160 MW representative wind facility used in this study.[6]

During the operations phase of the representative wind energy project, tax revenues are generated for both state and local governments. As shown in Table A1, these amount to $28.02 million in state tax revenues and $40.83 in county tax revenues over the assumed 25 year operating life of the facility. At the end of the operations phase, this study assumed a one-year decommissioning phase. The activities during this phase of the project generate $2.02 million in state tax revenues and $2.19 million for county governments.

As seen in Table A1, the representative wind project generates significant revenues that are generated during the construction, operation, and decommissioning of these projects. The overall effect on tax revenues is overwhelmingly positive with cumulative tax revenues exceeding $33.1 million for the state and an additional $44.2 million to taxing districts in the counties. In terms of the net effects on tax revenues for state and county governments, the initial rebate expenditure of $12 million for the representative wind energy project is recovered in year three of the operations phase of the project. The state recovers its initial expenditures on sales and use tax rebates in year twelve of the operations phase. The overall net effect on state tax revenues is overwhelmingly positive with cumulative net tax revenues exceeding $21 million. Thus, the initial expenditure by the state of $12 million in sale and use tax rebates results in a net gain of $21.07 million in state tax revenues plus an additional $44.2 million in revenues for county governments. The overall conclusion is that, to the extent that the provision of a sales and use tax rebate incentive induces wind energy producers to locate in the state, as opposed to locating elsewhere, there are significant positive revenue effects generated during the construction, operation, and decommissioning of these project.

5. Conclusion

If projects are located in Idaho's neighboring states, where the tax incentives available to alternative energy developers are more favorable, the positive economic and fiscal benefits of these projects are not realized in Idaho. To the extent that Idaho Statute 63-3622QQ results in projects locating in Idaho when, in the absence of such an incentive, they would locate elsewhere, the economic and fiscal impacts are unambiguously positive. In the case where a project would be located in Idaho, even without the incentive offered by the sales and use tax rebate, the cost to the State's tax revenues of the rebate provision consisted of rebated tax revenue that the State could have retained. Even in these cases, this study demonstrates that there are significant and positive net effects on tax revenues to state and local governments in Idaho. In other words, the benefits in terms of increased tax revenues to the State exceed the costs. Positive net benefits in terms of tax revenues, however, are not the only payback to the State. Coupled with the fiscal impacts, the additional economic impacts of increasing employment, incomes, and total output in the state further support the positive net overall benefits. To the extent that the expiration of this incentive program in July 2011 results in wind energy projects locating in other states, these benefits will be lost. Reinstating the provisions of this, or other incentive programs, with the increased wind development in Idaho, will enable the State to regain the positive net benefits of such projects in terms of increased revenues and economic activity into the future.

Apendix A

See Appendix Table A1.

[6] As described in Section 3.2, tax revenues to the state stem from sales and use tax for expenditures not subject to the sales and use tax rebate, individual and corporate income taxes, cigarette, beer, wine, liquor, and tobacco taxes, motor fuels

(*footnote continued*)
taxes, and insurance premium taxes. Tax revenues to counties stem from PILOT payments.

Table A1
Total tax revenues generated to the state of Idaho and Idaho county governments from the construction and operation of a windpower Facility (Individual income tax, corporate income tax, sales tax, cigarette tax, tobacco tax, beer tax, wine tax, motor fuels tax, liquor dispensary, insurance premium tax).

		Tax revenues to the state from the construction, operation, decommissioning, and payments in lieu of taxes		**Tax revenues to the state from use taxable purchases**		**Cumulative tax revenues to the state including revenues from use taxable purchases**	**Tax revenues to the state from lease payments paid to private landowners**		**Cumulative tax revenues to state government**	**Payments to counties in lieu of taxes**		**Cumulative tax revenues to the state and to county governments**
	Year	**Annual tax revenues generated to the state**	**Cumulative revenues generated to the state**	**Annual tax revenues to the state from use taxable purchases**	**Cumulative tax revenues to the state from use taxable purchases**		**Annual tax revenues to the state from lease payments paid to private landowners**	**Cumulative tax revenues to the state from lease payments paid to private landowners**	**Cumulative tax revenues to the state including revenues from use taxable purchases and lease payments to private landowners**	**Annual revenues to county governments from payments in lieu of taxes**	**Cumulative tax revenue to county governments from payments in lieu of taxes**	
Construction	1	$4,043,062.15	$4,043,062.15	$937,035.60	$937,035.60	$4,980,097.75	$75,523.02	$75,523.02	$5,055,620.76	$1,182,614.00	$1,182,614.00	$6,238,234.76
Operation	2	$485,236.74	$4,528,298.89	$167,163.00	$1,104,198.60	$4,695,461.89	$80,187.39	$155,710.40	$4,851,172.29	$1,210,996.74	$2,393,610.74	$7,244,783.02
	3	$509,686.59	$5,037,985.48	$173,749.93	$1,277,948.53	$5,211,735.41	$82,192.07	$237,902.47	$5,449,637.89	$1,240,060.66	$3,633,671.39	$9,083,309.28
	4	$535,491.50	$5,573,476.98	$177,224.93	$1,455,173.46	$5,750,701.91	$84,246.87	$322,149.34	$6,072,851.25	$1,269,822.11	$4,903,493.51	$10,976,344.76
	5	$562,730.06	$6,136,207.04	$180,769.43	$1,635,942.89	$6,316,976.47	$86,353.04	$408,502.39	$6,725,478.86	$1,300,297.84	$6,203,791.35	$12,929,270.21
	6	$591,485.56	$6,727,692.59	$184,384.82	$1,820,327.71	$6,912,077.41	$88,511.87	$497,014.26	$7,409,091.67	$1,331,504.99	$7,535,296.34	$14,944,388.01
	7	$621,846.18	$7,349,538.77	$225,639.31	$2,045,967.01	$7,575,178.08	$90,724.67	$587,738.93	$8,162,917.01	$1,363,461.11	$8,898,757.46	$17,061,674.46
	8	$653,905.36	$8,003,444.13	$230,152.09	$2,276,119.11	$8,233,596.22	$92,992.78	$680,731.71	$8,914,327.94	$1,396,184.18	$10,294,941.63	$19,209,269.57
	9	$687,762.05	$8,691,206.19	$234,755.13	$2,510,874.24	$8,925,961.32	$95,317.60	$776,049.31	$9,702,010.63	$1,429,692.60	$11,724,634.23	$21,426,644.87
	10	$723,521.08	$9,414,727.27	$239,450.24	$2,750,324.47	$9,654,177.50	$97,700.54	$873,749.86	$10,527,927.36	$1,464,005.22	$13,188,639.46	$23,716,566.82
	11	$761,293.49	$10,176,020.76	$244,239.24	$2,994,563.72	$10,420,260.00	$100,143.06	$973,892.92	$11,394,152.92	$1,499,141.35	$14,687,780.80	$26,081,933.72
	12	$801,196.92	$10,977,217.68	$316,068.76	$3,310,632.48	$11,293,286.44	$102,646.63	$1,076,539.55	$12,369,825.99	$1,535,120.74	$16,222,901.54	$28,592,727.53
	13	$843,355.97	$11,820,573.64	$322,390.14	$3,633,022.61	$12,142,963.78	$105,212.80	$1,181,752.35	$13,324,716.13	$1,571,963.64	$17,794,865.18	$31,119,581.31
	14	$887,902.65	$12,708,476.29	$328,837.94	$3,961,860.55	$13,037,314.23	$107,843.12	$1,289,595.47	$14,326,909.70	$1,609,690.76	$19,404,555.94	$33,731,465.64
	15	$934,976.82	$13,643,453.12	$335,414.70	$4,297,275.25	$13,978,867.82	$110,539.20	$1,400,134.67	$15,379,002.48	$1,648,323.34	$21,052,879.29	$36,431,881.77
	16	$984,726.65	$14,628,179.77	$342,122.99	$4,639,398.24	$14,970,302.76	$113,302.68	$1,513,437.34	$16,483,740.10	$1,687,883.10	$22,740,762.39	$39,224,502.49
	17	$1,037,309.09	$15,665,488.86	$348,965.45	$4,988,363.69	$16,014,454.31	$116,135.24	$1,629,572.59	$17,644,026.90	$1,728,392.30	$24,469,154.69	$42,113,181.59
	18	$1,092,890.46	$16,758,379.32	$355,944.76	$5,344,308.45	$17,114,324.08	$119,038.63	$1,748,611.21	$18,862,935.29	$1,769,873.71	$26,239,028.40	$45,101,963.69
	19	$1,151,646.93	$17,910,026.24	$363,063.66	$5,707,372.11	$18,273,089.90	$122,014.59	$1,870,625.80	$20,143,715.70	$1,812,350.68	$28,051,379.08	$48,195,094.78
	20	$1,213,765.18	$19,123,791.42	$370,324.93	$6,077,697.04	$19,494,116.35	$125,064.96	$1,995,690.76	$21,489,807.11	$1,855,847.10	$29,907,226.18	$51,397,033.29
	21	$1,279,442.99	$20,403,234.42	$377,731.43	$6,455,428.46	$20,780,965.84	$128,191.58	$2,123,882.34	$22,904,848.18	$1,900,387.43	$31,807,613.61	$54,712,461.79
	22	$1,348,889.92	$21,752,124.34	$385,286.06	$6,840,714.52	$22,137,410.40	$131,396.37	$2,255,278.71	$24,392,689.10	$1,945,996.73	$33,753,610.33	$58,146,299.44
	23	$1,422,328.00	$23,174,452.34	$392,991.78	$7,233,706.30	$23,567,444.11	$134,681.28	$2,389,959.99	$25,957,404.10	$1,992,700.65	$35,746,310.98	$61,703,715.08
	24	$1,499,992.47	$24,674,444.80	$400,851.61	$7,634,557.91	$25,075,296.42	$138,048.31	$2,528,008.30	$27,603,304.71	$2,040,525.46	$37,786,836.44	$65,390,141.16
	25	$1,582,132.60	$26,256,577.40	$408,868.64	$8,043,426.55	$26,665,446.05	$141,499.52	$2,669,507.82	$29,334,953.87	$2,089,498.07	$39,876,334.52	$69,211,288.38
Operation	26	$1,669,012.52	$27,925,589.92	$417,046.02	$8,460,472.57	$28,342,635.94	$145,037.01	$2,814,544.82	$31,157,180.76	$2,139,646.03	$42,015,980.55	$73,173,161.31
Decommissioning	27	$2,017,833.21	$29,943,423.13	$164,267.05	$8,624,739.62	$30,107,690.18	$148,662.93	$2,963,207.75	$33,070,897.94	$2,190,997.53	$44,206,978.08	$77,277,876.02

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